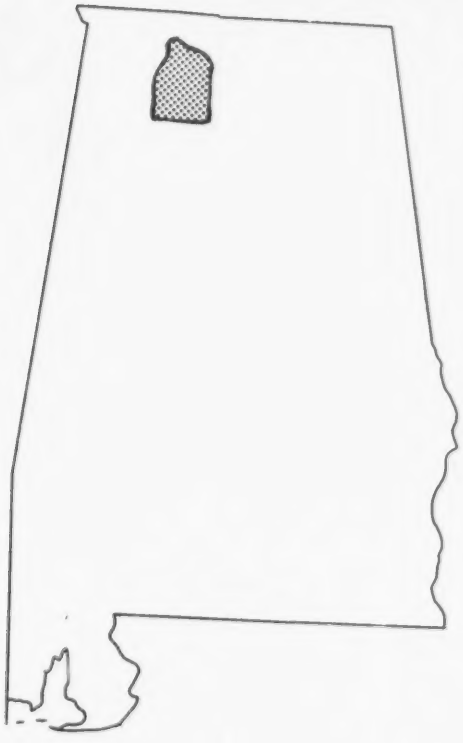
010324

NEWARK PUBLIC LIBRARY
APR 2 1981
U. S. GOVT. PUBS.
DEPOSITORY 376

FLOOD INSURANCE STUDY

LAWRENCE COUNTY, ALABAMA
UNINCORPORATED AREAS

best copy available



DECEMBER 15, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 010324

FEM 1.209:

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Coordination	1
1.3	Authority and Acknowledgments	1
2.0	AREA STUDIED	2
2.1	Scope of Study	2
2.2	Community Description	2
2.3	Principal Flood Problems	5
2.4	Flood Protection Measures	5
3.0	ENGINEERING METHODS	6
3.1	Hydrologic Analyses	6
3.2	Hydraulic Analyses	9
4.0	FLOOD PLAIN MANAGEMENT APPLICATIONS	10
4.1	Flood Boundaries	10
4.2	Floodways	10
5.0	INSURANCE APPLICATION	14
5.1	Reach Determinations	15
5.2	Flood Hazard Factors	15
5.3	Flood Insurance Zones	15
5.4	Flood Insurance Rate Map Description	16

TABLE OF CONTENTS - continued

		Page
6.0	OTHER STUDIES	18
7.0	LOCATION OF DATA	19
8.0	BIBLIOGRAPHY AND REFERENCES	19

FIGURES

Figure 1 -	Vicinity Map	3
Figure 2 -	Floodway Schematic	14

TABLES

Table 1 -	Stream Gages	6-7
Table 2 -	Summary of Discharges	8
Table 3 -	Floodway Data	12-13
Table 4 -	Flood Insurance Zone Data	17

EXHIBITS

Exhibit 1 -	Flood Profiles	
	Big Nance Creek	Panel 01P
	Muddy Fork	Panels 02P-03P
	Crow Branch	Panels 04P-06P
	Lateral No. 8	Panels 07P-08P
Exhibit 2 -	Flood Boundary and Floodway Map Index	
Exhibit 3 -	Flood Boundary and Floodway Map	

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
LAWRENCE COUNTY, ALABAMA

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in Lawrence County, Alabama, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of the information will be to convert Lawrence County to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

Identification of streams to be studied was made on April 14, 1978, in a meeting held in Moulton, Alabama, attended by representatives from the county, Tennessee Valley Authority (TVA), FIA, North-Central Alabama Regional Council of Governments (NARCOG), and private citizens.

On March 11, 1980, the results of the studies performed by TVA were reviewed at a final coordination meeting in Moulton attended by representatives of TVA, FIA, NARCOG, and Lawrence County.

1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the Tennessee Valley Authority for the Federal Insurance Administration under Interagency Agreement No. IAA-H-15-78, Project Order No. 2. This work, which was completed in May 1979, covered all significant flooding sources in Lawrence County, as identified at the April 14, 1978, meeting with the county.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Lawrence County, Alabama. The area of study is shown on the Vicinity Map (Figure 1).

The streams selected for detail study are those that flow through existing development or where development is likely. The following streams were selected for detailed study:

Stream	Mile
Big Nance Creek	11.71-15.53
Muddy Fork	6.87-10.83
Crow Branch	0.70-1.90
Lateral No. 8	0.00-1.00

Other streams flowing through areas with low potential for development or through areas that will not be developed within the next 5 years (through April 1983) were studied by approximate methods. These stream are shown on the Flood Hazard Boundary Maps for Lawrence County dated May 13, 1977.

Areas not included in the study are the incorporated Towns of Courtland and Town Creek, the City of Moulton and the William Bankhead National Forest.

2.2 Community Description

Lawrence County is located in northern Alabama and is bounded by the Tennessee River to the north, Morgan County to the east, Winston County to the south, and Franklin and Colbert Counties to the west.

Lawrence County is older than the State of Alabama. It was created by an act of the Alabama Territorial Legislature in February 1818, from land ceded by the Cherokee and Chickasaw Indians (Reference 1). Early settlers immigrated into the county about 1800 from Tennessee, Georgia, Kentucky, and the Carolinas. Moulton is the county seat. The county area is 685 square miles.

The 1970 population was 27,281, an increase of 11.3 percent over the 1960 population of 24,501 (Reference 2).

Residential and commerical development is centered in and around incorporated areas and are subject to flooding by Big Nance Creek, Crow Branch, and Almon Branch.

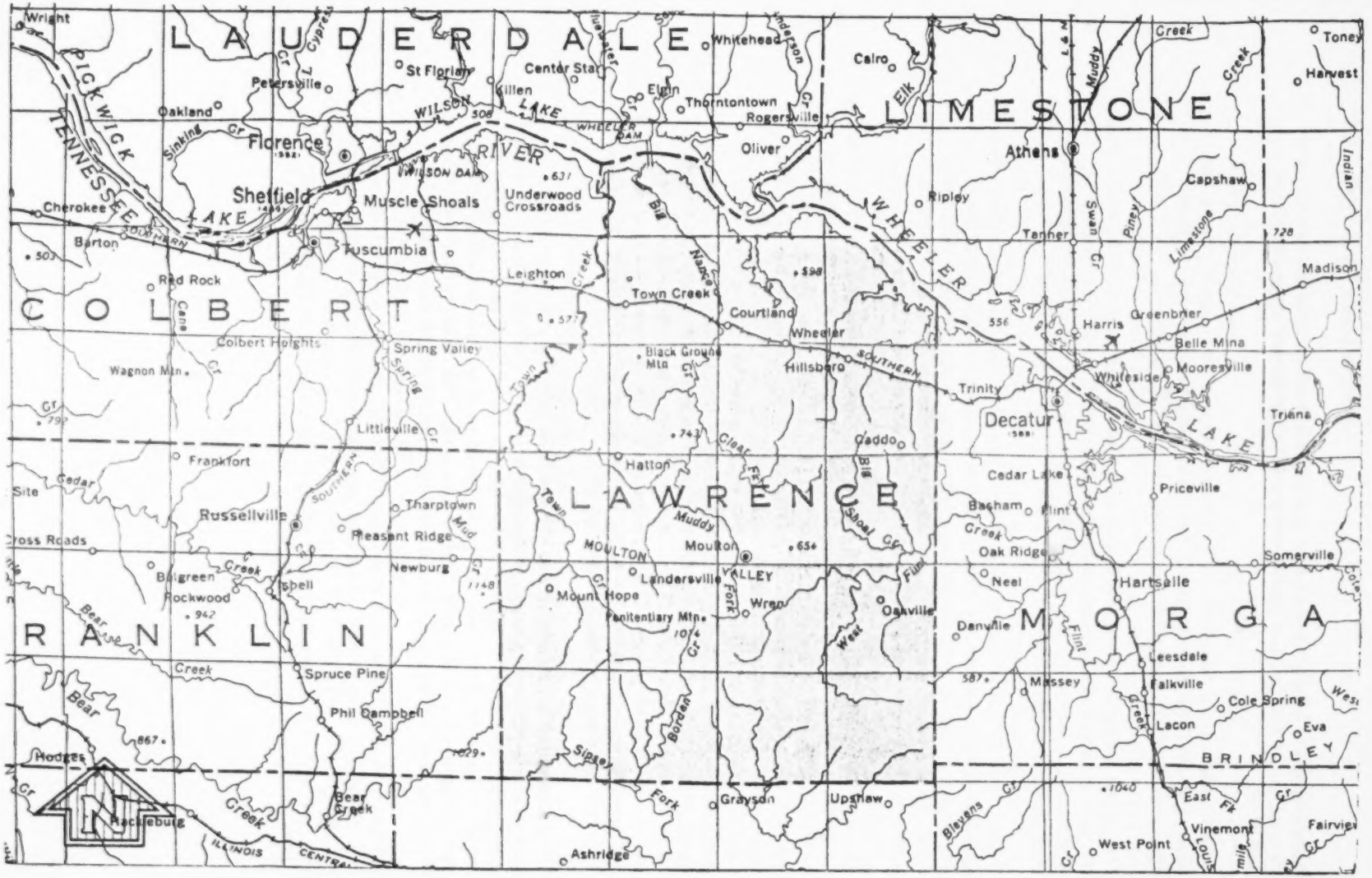


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL

(UNINCORPORATED AREAS)

APPROXIMATE SCALE

10 0 10 20 Miles

VICINITY MAP

Approximately 43 percent of the county is forestland (Reference 3), with 22 percent of the bottom land covered with hardwood trees (maple, beech, and elm).

Other commerical developments, but not subject to flooding, are located along the main route between Tuscumbia and Decatur (U.S. Highway 72A). The remainder of the county is predominantly agricultural.

The detail streams are in the Big Nance Creek watershed. This watershed drains an area of 193 square miles in Lawrence County (Reference 1). The watershed is 26 miles long, fan-shaped above Courtland, and rectangular in shape below Courtland.

Muddy Fork is formed north of the junction of Almon and Crow Branches near Moulton and drains northward from the Tennessee Valley Divide. Big Nance Creek is formed by the confluence of Muddy Fork and Clear Fork about 6 miles south of Courtland (Reference 1). The creek flows northward and empties into Wilson Lake at Tennessee River mile 274.1.

The watershed varies from gently sloping valleys to steep hills; the elevations range from about 1000 feet above National Geodetic Vertical Datum of 1929 (NGVD), in the headwaters to 520 feet NGVD near the mouth. The Big Nance Creek flood plain varies from narrrow above Rutherford Creek to extremely wide above and below Courtland.

Muddy Fork has a drainage area of 74.7 square miles at its mouth and 16 square miles below Crow Branch. Within the limits of study for Muddy Fork, the flood plain is wide and undeveloped. The Soil Conservation Service (SCS) channelized this stream in 1967 to reduce the flood potential and provide land for development. This channel improvement has reduced seasonal flooding on Muddy Fork.

Crow Branch, a tributary of the Muddy Fork tributary to Big Nance Creek, originates of few miles south of Moulton. The branch falls from elevation 638 to 599 feet NGVD, with an average slope of 9 feet per mile. The flood plain of Crow Branch ranges from 300 feet to 2000 feet in width and has an average width of 1100 feet (Reference 4). The SCS inproved sections of the channel in 1967. There is some development on the flood plain.

Temperatures in the area range from a high of approximately 106 degrees F to a low of -6 degrees F. The average maximum and minimum temperatures in Lawrence County are 71.9 degrees F and 51.2 degrees F respectively. The average annual precipitation in Lawrence County is 50.88 inches.

2.3 Principal Flood Problems

The principal sources of flooding in Lawrence County are Big Nance Creek, Muddy Fork, Crow Branch, and Lateral No. 8.

Big Nance Creek

The greatest flood known since 1891 on Big Nance Creek occurred on March 16, 1973. The U.S. Geological Survey (USGS) gage at Courtland, mile 12.92, had a discharge of 27,200 cubic feet per second (cfs) and a recurrence interval of about 500 years. Streets near the creek were flooded to a depth of up to 5 feet. Approximately 75 buildings in town were flooded. This flood crested 2 feet higher than any other flood since the gage was installed in 1936 (References 5 and 6). The July 1916 flood had a peak discharge of 14,000 cfs and a recurrence interval of 20 years (Reference 1).

Flood conditions on Muddy Fork and Crow Branch have been altered by the SCS channelization project completed in 1967. Prior to the completion of the improved channel, floods occurred on Crow Branch in March 1902, July 1916, February 1939, and February 1946, but the most damaging flood of record was on March 12, 1963, which flooded one house and surrounded several others (Reference 7). Flood elevation and discharge data are not available for this flood.

A major flood occurred on March 16, 1973, on Crow Branch. Ten houses were evacuated in the Moulton area. The Stardust Mobile Homes factory downstream from Highway 24 suffered damage in excess of $50,000 from water being 2 feet deep in the plant. Bill's Building Supplies was flooded with estimated damage of about $180,000 (Reference 6). No discharges or elevations are available.

No flood information is available for Muddy Fork and Lateral No. 8.

2.4 Flood Protection Measures

The SCS in 1962 proposed the Big Nance Creek watershed work plan consisting of nine earthfill dams in upper tributaries to reduce flooding downstream on Big Nance Creek (Reference 8). At present, only limited upstream channel improvement work has been completed. The upstream channel improvement of Crow Branch was completed in 1967. An approximate 5-year level of protection is afforded by the channelization.

3.0 ENGINEERING METHODS

For flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10-, 50-, 100-, and 500-years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the drainage areas of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in Lawrence County.

The USGS gaging station No. 03586500 on Big Nance Creek was the principal source of data for defining discharge-frequency relationships for Big Nance Creek. The recording gage has been operated since 1936. A flood frequency relationship was developed from this record using the procedure outlined in Bulletin 17A (Reference 9), including the skew map, plate 1, and adjustment for available historic information.

No formal stream gaging stations have been maintained on Muddy Fork, Crow Branch, and Lateral No. 8. Discharge-frequency relationships for these streams were estimated using relationships of peak discharge and drainage area developed from analysis of records at nearby gaging stations listed in Table 1, Stream Gages.

TABLE 1 - STREAM GAGES

Location	Gage Number	Drainage Area (Sq. Miles)	Period of Record	Agency
Cedar Creek near Pleasant Site, Alabama	03592500	188	1957-77	USGS
Big Nance Creek at Courtland, Alabama	03586500	161	1936-77	USGS
Bear Creek near Hackleburg, Alabama	03591800	143	1957-77	USGS
Cotaco Creek at Florette, Alabama	03576148	136	1966-75	USGS
Little Bear Creek near Halltown, Alabama	03592300	28.2	1958-77	USGS

TABLE I - STREAM GAGES - continued

Piney Creek near Athens, Alabama	03576400	55.8	1960-70	USGS
Bear Creek at Posey Mill, Alabama	03591570	26.8	1964-75	TVA
Dorsey Creek near Arkadelphia, Alabama	02450200	13	1959-74	USGS
Glover Cove Creek near Huntsville, Alabama	03575340	3.5	1971-74	USGS
Big Huckleberry Creek near Belvedere, Tenn.	03574700	2.18	1955-74	USGS
Little Flat Creek near Ralley Hill, Tenn.	03599400	0.63	1955-73	USGS
Bluewater Creek Tributary near Leoma, Tenn.	03587200	0.49	1955-73	USGS
Walker Branch near Huntsville, Alabama	03574796	0.44	1971-74	USGS
Straight Ditch at Huntsville, Alabama	03574872	0.2	1971-74	USGS

Sources of information used in this table are References 10, 11, and 12.

Frequency curves for the gaged locations used to define regional relationships were computed using the procedure outlined in Bulletin 17A (Reference 9), including the skew map, plate 1, and adjustments for historic flood information where available. The adopted regional peak flow-drainage area relationships are the same as adopted for the Flood Insurance Studies of the City of Moulton and the Town of Courtland, Alabama.

Currently there is not sufficient urbanization of Muddy Fork or Crow Branch watersheds to alter flood peaks. Muddy Fork and Crow Branch were channelized in 1967. Increased flows due to channelization were computed using the equation $Q_{pc} = (I_n/I_c)^{x} Q_{pn}$, developed from work by Espey and Winslow (Reference 13) where:

Q_{pc} = discharge for selected probabailty, p, for channelized conditions

Q_{pn} = discharge for selected probability, p, for natural channel conditions

I_n = a channel vegetation factor for natural channel conditions

I_c = a channel improvement factor

x = an exponent varying with flood probability, p

The adopted flow estimates were compared with results obtained using USGS relationships developed in 1977 (Reference 14). Flow frequency estimates made using the USGS relationships were 10 percent larger than the adopted Lawrence County FIS relationships. This difference results from limiting the analysis to records for similar watersheds in the region including those in Tennessee. The USGS equations are based upon records for the entire State of Alabama; thus, regional differences are masked.

Peak discharges and drainage areas for the 10-, 50-, 100-, and 500-year floods on the streams studied in detail are shown in Table 2, "Summary of Discharges."

TABLE 2 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
BIG NANCE CREEK					
at Highway 20 bridge	159	11,500	17,500	20,000	27,000
mile 14.95	151	11,000	17,000	19,000	26,000
at John R. Bridge	117	9,400	14,000	16,000	22,000
MUDDY FORK					
mile 6.80	48.5	7,700	12,300	15,000	23,300
mile 8.10	32.1	5,700	9,200	11,000	17,500
mile 8.60	19.6	4,000	6,500	8,000	12,500
mile 10.20	16.0	3,600	5,700	7,200	11,200
mile 10.83	15.3	3,500	5,500	6,850	10,400
CROW BRANCH					
mile 0.68*	13.0	3,100	4,600	5,800	9,000
mile 1.10	11.8	2,850	4,400	5,400	8,300
mile 1.62	11.1	2,750	4,300	5,300	8,100
LATERAL NO. 8					
mouth	2.28	700	1,000	1,150	1,500
mile 0.70	2.08	620	900	1,050	1,400
mile 1.25	1.72	580	830	960	1,250

*Crow Branch mileage was changed because of channel changes on Muddy Fork; mile 0.68 is new mouth of Crow Branch.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in detail.

Water-surface elevations of floods for the selected recurrence intervals were computed through use of the U.S. Army COE HEC-2 backwater program (Reference 15). Cross sections for Big Nance Creek, Muddy Fork, Crow Branch, and Lateral No. 8 were field surveyed at bridges and other strategic locations and supplemented with valley cross sections taken by photogrammetric methods at sufficiently close intervals to accurately compute water-surface elevations. The locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

Channel roughness factors (Manning's "n") for these computations were determined on the basis of field inspection of channel and flood plain areas, on previous studies by TVA, and computed coefficients based on known flood profiles.

The range in values for Manning's "n" are tabulated below:

Stream	Channel	Overbank
Big Nance Creek	0.021-0.088	0.045-0.211
Muddy Fork	0.032-0.040	0.060-0.120
Crow Branch	0.035	0.060-0.140
Lateral No. 8	0.030-0.050	0.060-0.150

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). Starting water-surface elevations for Crow Branch and Muddy Fork were obtained by slope-area calculations using the slope of surveyed floodmarks. Lateral No. 8 was started by slope-area calculations using the slope of the streambed. The starting elevations for Big Nance Creek were based on data which had been computed for the Courtland, Alabama, FIS.

All elevations are measured from NGVD; elevation reference marks used in the study are shown and described on the maps.

The flood elevations as shown on the profiles are considered valid only if hydraulic structures in general remain unobstructed, operate properly, and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is used to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the flood elevations at each cross section; between cross sections, the boundaries were interpolated using aerial photography at a scale of 1:9600. The flooded area was enlarged to a scale 1:6000 and traced on enlarged 7. 5-Minute Series topographic maps of the same scale (Reference 16). In cases where the 100-year and the 500-year boundaries are close together, only the 100-year boundary has been shown.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways were computed by setting encroachments in the stream overbanks; testing these with the backwater program, adjusting and re-testing them until and allowable increase in flood elevation is reached. This procedure has been used by TVA for may years to provide technical flood plain management assistance to Tennessee Valley communities.

In this procedure the floodway limit lines are located to allow use of some presently flood-prone areas at the expense of some increase in flood levels. The limit lines are located in a manner which provides land where it is estimated to serve the community's needs best. The results of these computations are tabulated at selected cross sections for each stream studied (Table 3). As shown on the Floodway Boundary and Floodway Map (Exhibit 3), the floodway boundaries were determined at cross sections; between cross sections the boundaries were interpolated.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Big Nance Creek								
A	11.90	450	4,421	4.5	559.6	559.6	560.4	0.8
B	12.44	1,300	10,029	2.0	560.3	560.3	561.2	0.9
C	12.69	1,300	10,913	1.8	560.5	560.5	561.5	1.0
D	12.92	1,200	9,335	2.1	561.1	561.1	562.1	1.0
E	13.05	900	8,924	2.2	561.9	561.9	562.8	0.9
F	13.50	1000/850[2]	8,008	2.5	563.0	563.0	563.8	0.8
G	13.90	800	6,827	2.9	563.8	563.8	564.8	1.0
H	14.95	1,000	4,078	4.7	566.7	566.7	567.5	0.8
I	15.53	150	2,680	7.0	568.7	568.7	569.2	0.5
Muddy Fork								
A	6.87	350	2,809	5.3	593.3	593.3	594.3	1.0
B	7.31	900	7,765	1.7	596.0	596.0	596.7	0.7
C	7.57	1,000	6,534	1.9	596.4	596.4	597.3	0.9
D	8.15	900	5,413	2.0	597.9	597.9	598.9	1.0
E	9.52	700	3,771	2.0	604.7	604.7	605.4	0.7
F	10.18	500	2,179	3.3	608.3	608.3	609.1	0.8
G	10.83	800	3,661	1.9	611.5	611.5	612.5	1.0
Crow Branch								
A	1.05	370[3]	2,628	2.1	616.4	616.4	616.9	0.5
B	1.36	550	2,759	1.9	617.1	617.1	617.8	0.7

[1] Miles above mouth
[2] Total width/width within study area
[3] Measured perpendicular to flow

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL

(UNINCORPORATED AREAS)

FLOODWAY DATA

BIG NANCE CREEK MUDDY FORK-CROW BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Crow Branch (cont'd)								
C	1.62	450	1,763	3.0	618.5	618.5	619.5	1.0
Lateral No. 8								
A	0.30	50	204	5.4	611.8	611.8	612.3	0.5
B	0.68	40	201	5.2	615.9	615.9	616.1	0.2
C	0.76	80	283	3.7	617.1	617.1	617.7	0.6
D	0.90	100	347	2.9	618.1	618.1	618.9	0.8

[1]Miles above mouth.

TABLE 3

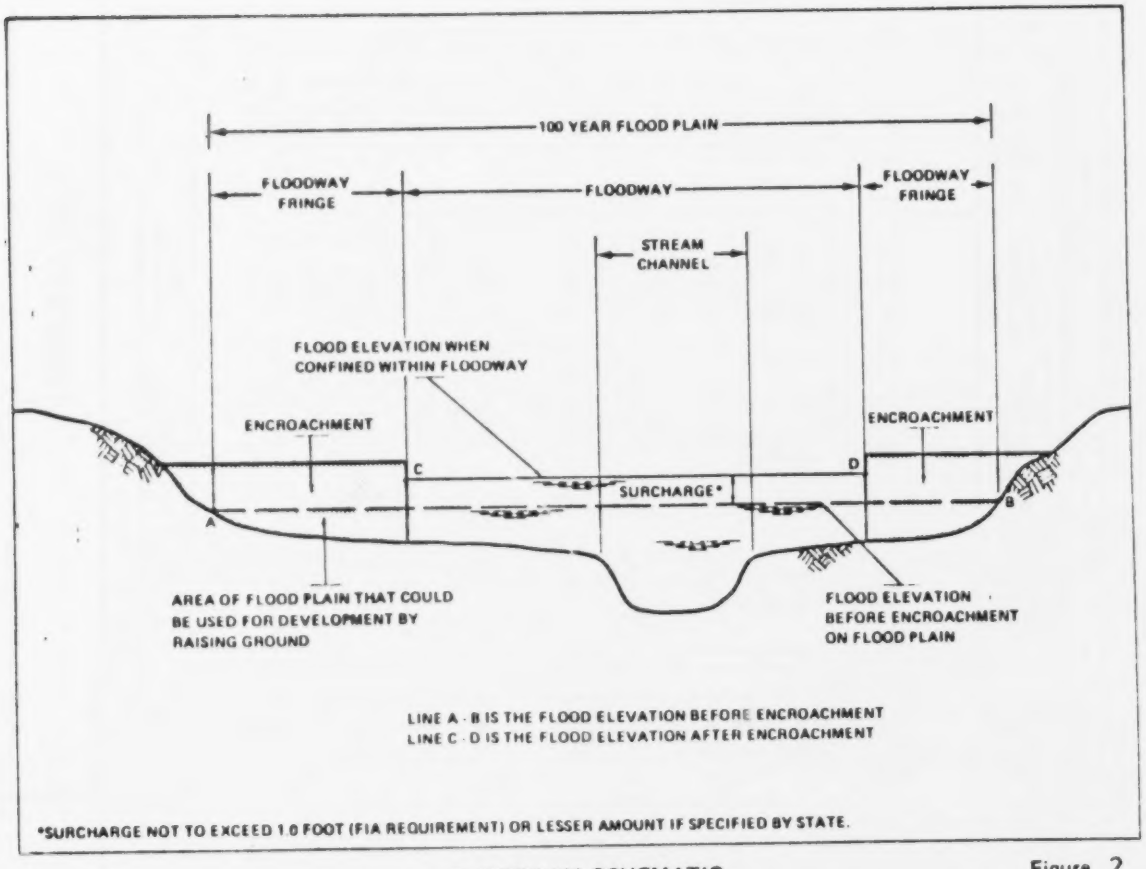
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL

(UNINCORPORATED AREAS)

FLOODWAY DATA

CROW BRANCH-LATERAL NO. 8


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC

Figure 2

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source studied in detail in Lawrence County, Alabama.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

Six reaches were required for the flooding sources in Lawrence County. These include two reaches each on Muddy Fork and Crow Branch and one reach each on Lateral No. 8 and Big Nance Creek. The locations of the reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors (FHFs)

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire unincorporated area of Lawrence County was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A2, A3, A4, A5, A6:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 4, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the county.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for Lawrence County is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Big Nance Creek							
Reach 1	0025,0040 0060,0080	-3.2	-0.8	+1.7	030	A6	Varies
Muddy Fork							
Reach 1	0107,0109 0126,0128	-2.2	-0.8	+1.9	020	A4	Varies
Reach 2	0128	-1.4	-0.5	+1.0	015	A3	Varies
Crow Branch							
Reach 1	0128	-1.3	-0.5	+1.0	015	A3	Varies
Reach 2	0128	-2.3	-0.7	+1.1	025	A5	Varies
Lateral No. 8							
Reach 1	0128	-1.2	-0.3	+0.6	010	A2	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT-SEE MAP

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

BIG NANCE CREEK - MUDDY FORK - CROW BRANCH - LATERAL NO. 8

6.0 OTHER STUDIES

At the request of the Tri-County Regional Planning Commission, the TVA prepared and published a flood report in 1963 (Reference 1). The intent of the report was to provide a basis for further study and planning to minimize their vulnerablility to flood damage.

Because the TVA flood report of 1963 involves flood profiles of different frequencies from those in this study, only a general comparison can be made, but there are no conflicts between the two reports.

The flooded area and floodway data used in this study in the vicinity of Courtland are the same as used in the Courtland, Alabama, FIS (Reference 5).

TVA published a special flood report for the City of Moulton in 1972 (Reference 7). This report related past and possible future flooding on Crow Branch, Almon Branch, and Eddy Creek to the City of Moulton and presented a 100-year flood having discharges one and one-half times greater than the March 11, 1963, flood on Crow and Almon Branches.

No floodmarks were taken throughout the county, so comparison between floods is only available near Moulton. The limits of study for Crow Branch in the 1972 "Special Report: extended from its mouth to mile 4.25 and includes part of the county.

Following is a table of differences between the TVA "Special Flood Report" (Reference 7) 100-year flood and the Lawrence County FIS 100-year flood.

CROW BRANCH

Lawrence County FIS	TVA "Special Flood Report"		Difference,
Elevation	Mile	Elevation	(Feet)
612.60	0.90	612.8	-0.20
616.40	1.05	616.0	+0.40
616.80	1.20	616.5	+0.30
618.40	1.60	618.4	0.00

The higher water-surface elevation for the Lawrence County FIS for Crow Branch (100-year flood) is caused by including the March 1973 flood in the Valley.

There are no conflicts between the Moulton FIS (Reference 4) and the Lawrence County FIS.

At the final coordination meeting for the City of Moulton held on October 18, 1978, it was found that Moulton had expanded its corporate limits. The new corporate limits were drawn on the Moulton and Lawrence County FIS maps.

Crow Branch and Lateral No. 8 flooding will correspond at the new Moulton corporate limits.

This study is authoritative for the purposes of the Flood Insurance Program and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Emergency Management Agency, Insurance and Mitigation Division, 1375 Peachtree Street, N.E., Atlanta, Georgia 30309.

8.0 BIBLIOGRPAHY AND REFERENCES

1. Tennessee Valley Authority, "Floods on Big Nance Creek in Vicinity of Courtland, Alabama," Report No. 0-6291, Division of Water Control Planing, Knoxville, Tennessee, May 1963.

2. U.S. Bureau of the Census, Census of Population, 1970, Characteristics of the Population, Alabama.

3. Soil Conservation Service, Series 1949, No. 10, "Soil Survey, Lawrence County, Alabama," November 1959.

4. U.S. Department of Housing and Urban Development, "City of Moulton, Alabama, Flood Insurance Study," prepared by TVA, January 1978.

5. U.S. Department of Housing and Urban Development, "Town of Courtland, Alabama, Flood Insurance Study," October 1977.

6. Tennessee Valley Authority, "Flood of March 1973 in the Tennessee River Basin," Report No. 0-7129, Division of Water Control Planning, Knoxville, Tennessee, June 1974.

7. Tennessee Valley Authority, "Floods on Crow Branch, Almon Branch, and Eddy Creek in Vicinity of Moulton, Alabama," Special Report, Knoxville, Tennessee, April 1972.

8. Soil Conservation Service, Watershed Work Plan, Big Nance Creek Watershed, Lawrence County, Alabama, 1962.

9. U.S. Water Resources Council "Guldelines for Determining Flood Flow Frequency," Bulletin 17A, Hydrology Committee, June 1977.

10. U.S. Geological Survey, Water Resources Data for Alabama, Annual Report, 1936-1977.

11. Tennessee Valley Authority, "Daily Discharges at TVA Stream Gages in the Tennessee River Basin," Report Nos. 8 and 9.

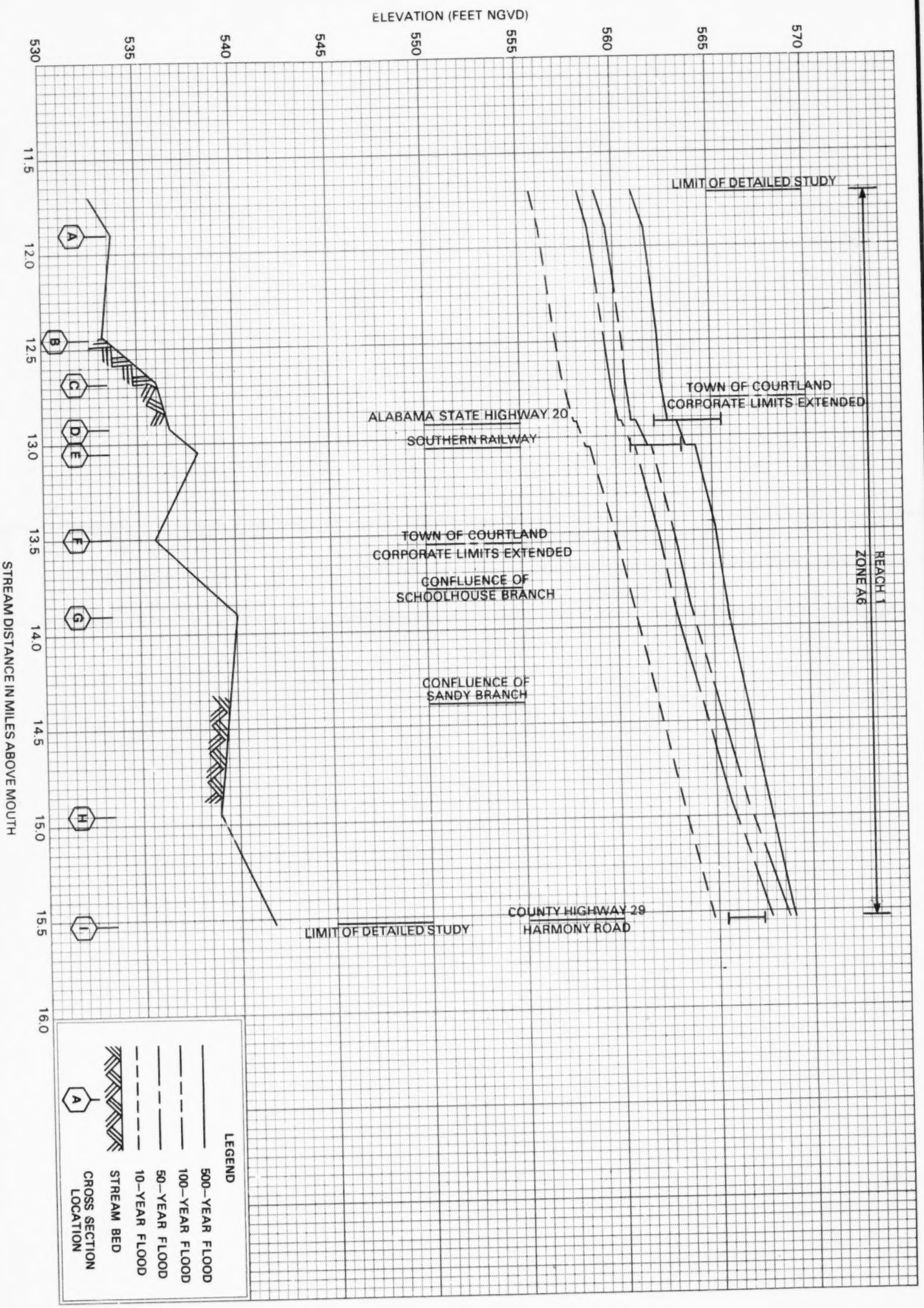
12. U.S. Geological Survey, "Water Resources Data for Tennessee," Annual Reports, 1955-1974.

13. W. H. Espey, Jr., and D. E. Winslow, "Urban Flood Frequency Characteristics," Proceedings of the American Society of Civil Engineers, Journal of Hydraulics Division, Volume 100, No. Hy2, pages 279-394, February 1974.

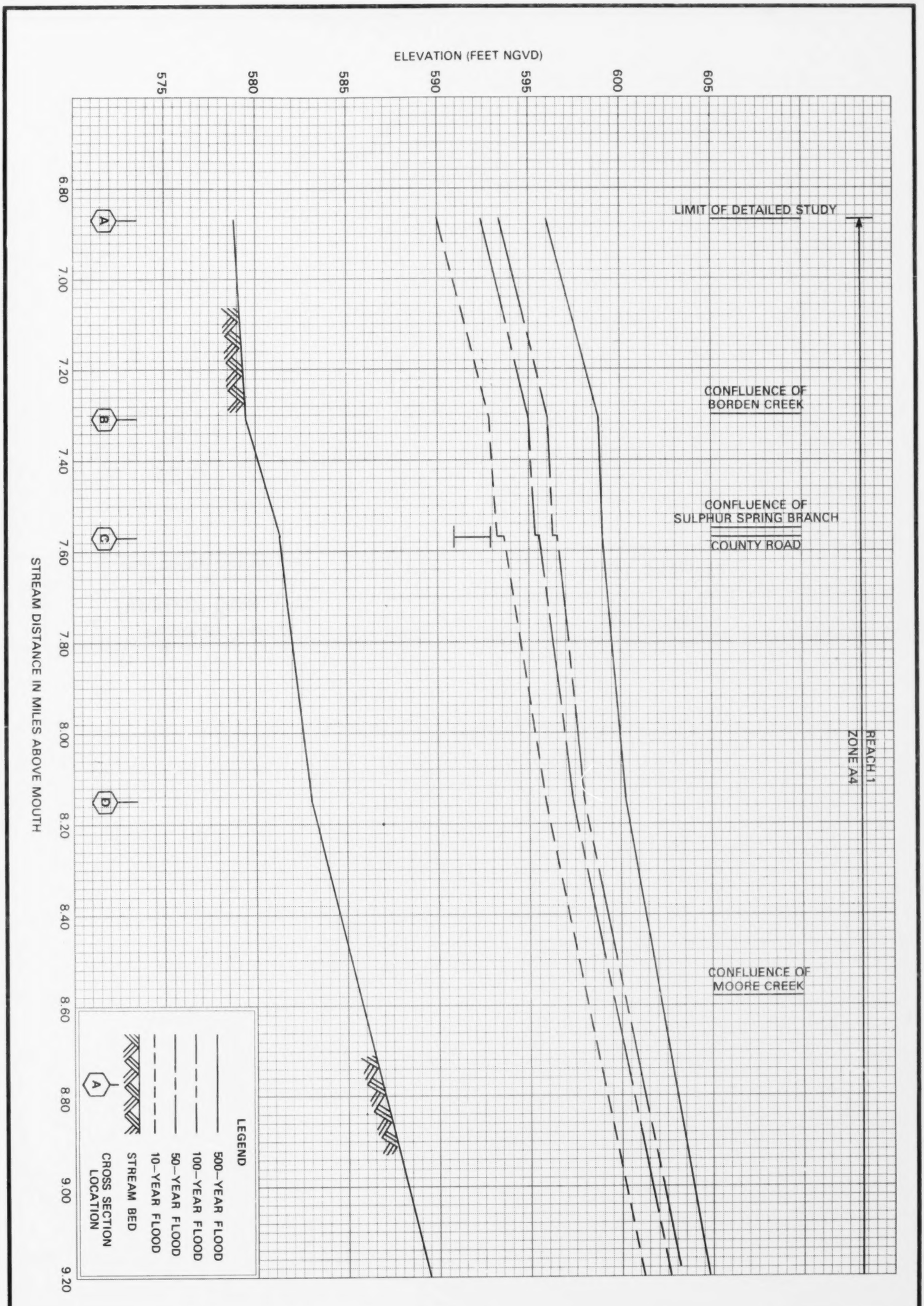
14. U.S. Geological Survey, "Flood Frequency of Small Streams in Alabama," Alabama Highway Research, August 1977.

15. U.S. Army, Corps of Engineers, Hydrologic Engineering Center, HEC-2N Water-Surface Profiles, Generalized Computer Program, Davis, California, November 1976, updated August 1977.

16. U.S. Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 feet: Moulton, Alabama (photorevised 1976), Courtland, Alabama (1974), Materson, Alabama (photorevised 1972).



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY Federal Insurance Administration **LAWRENCE COUNTY, AL** **(UNINCORPORATED AREAS)**	**FLOOD PROFILES** **BIG NANCE CREEK**



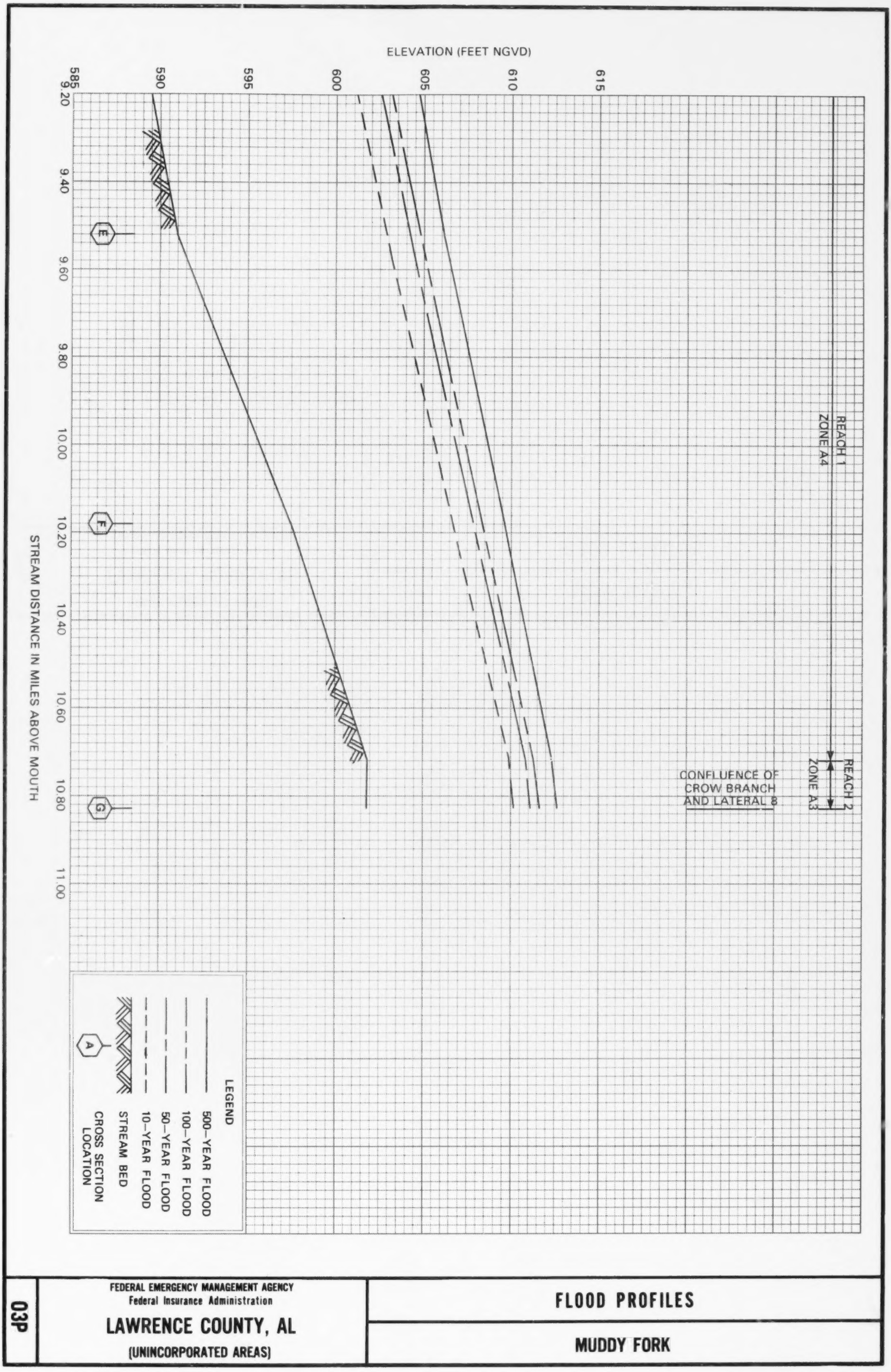
02P

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL
(UNINCORPORATED AREAS)

FLOOD PROFILES

MUDDY FORK



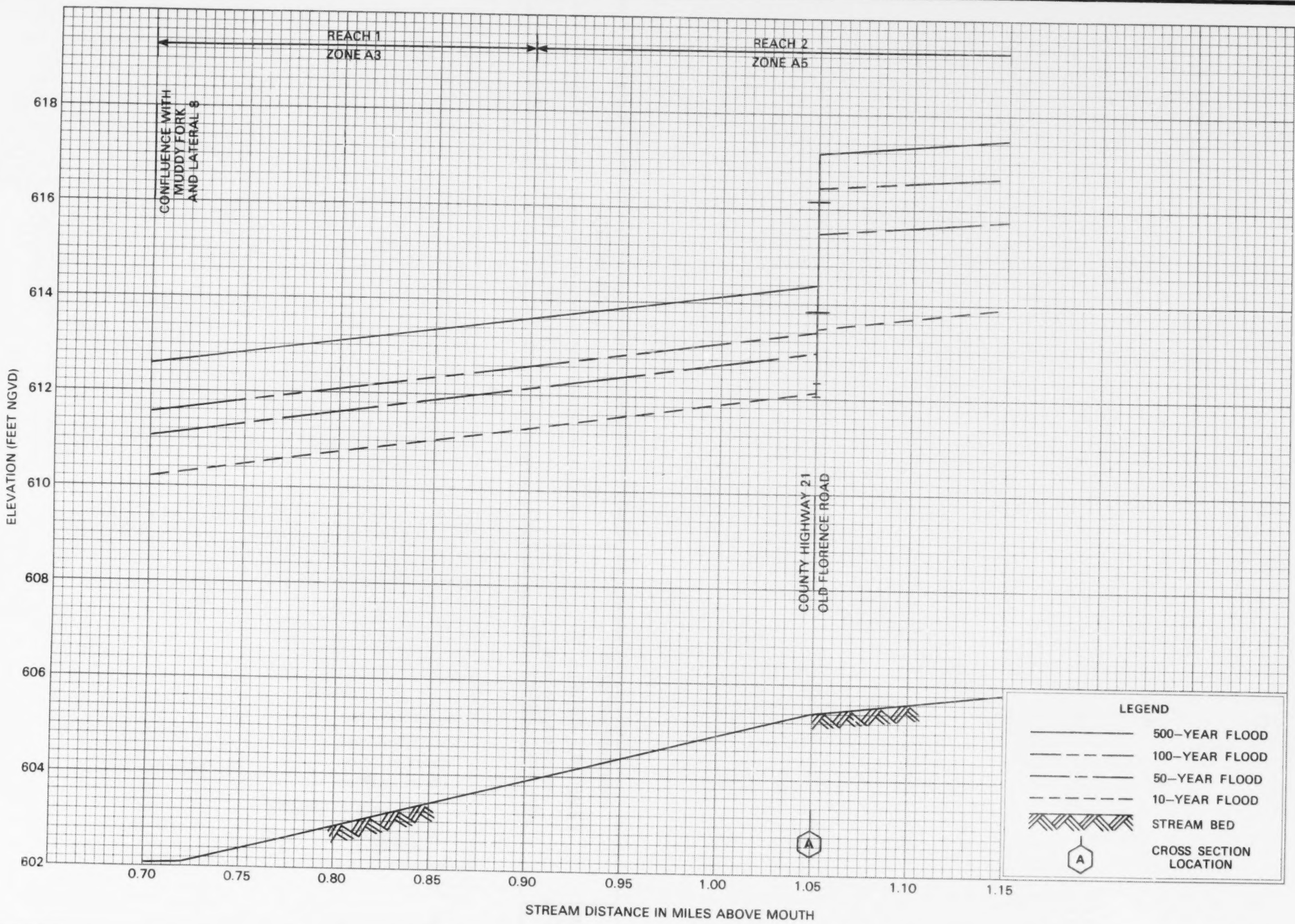
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL
(UNINCORPORATED AREAS)

FLOOD PROFILES

MUDDY FORK

03P



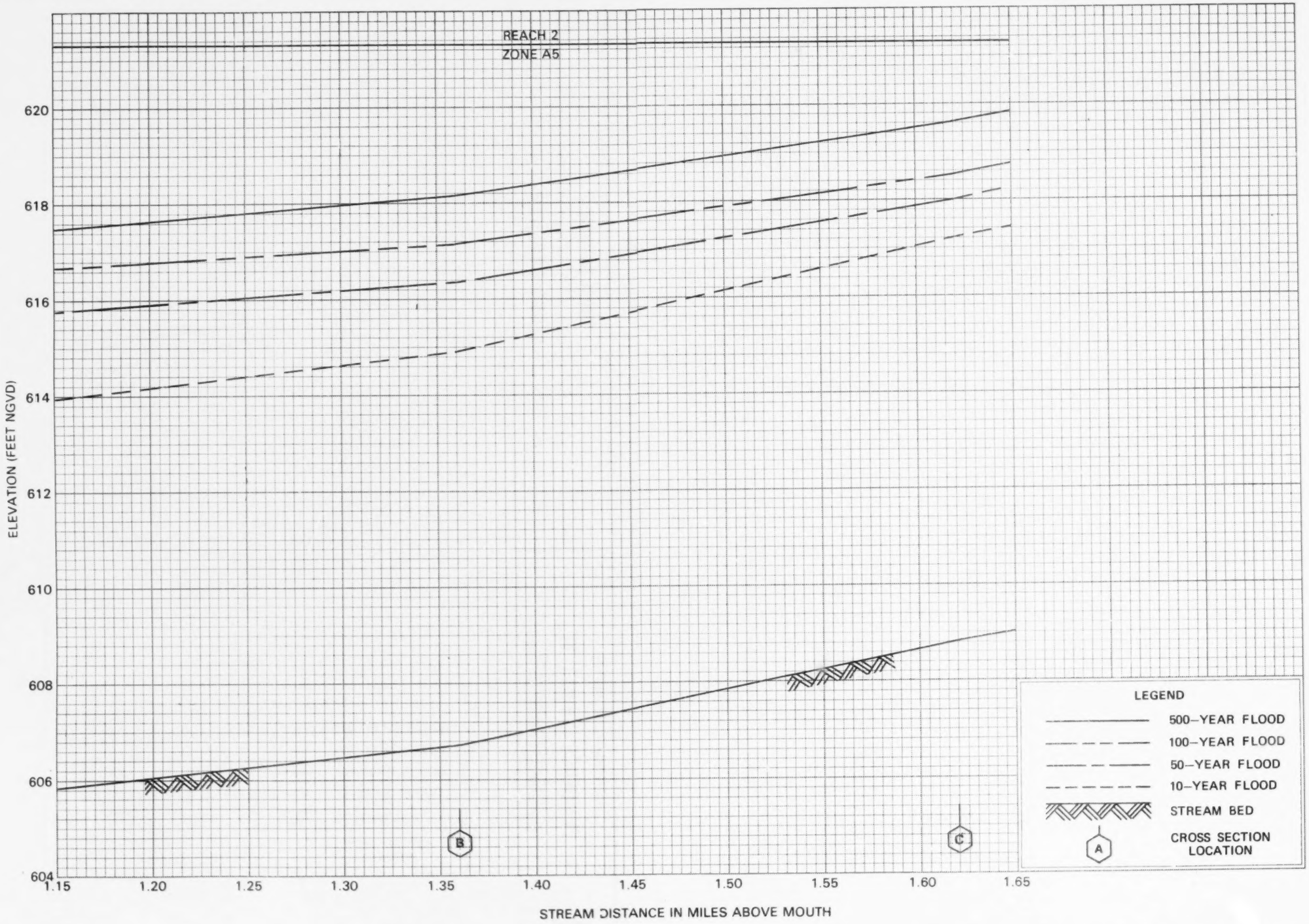
FLOOD PROFILES

CROW BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL
(UNINCORPORATED AREAS)

04P



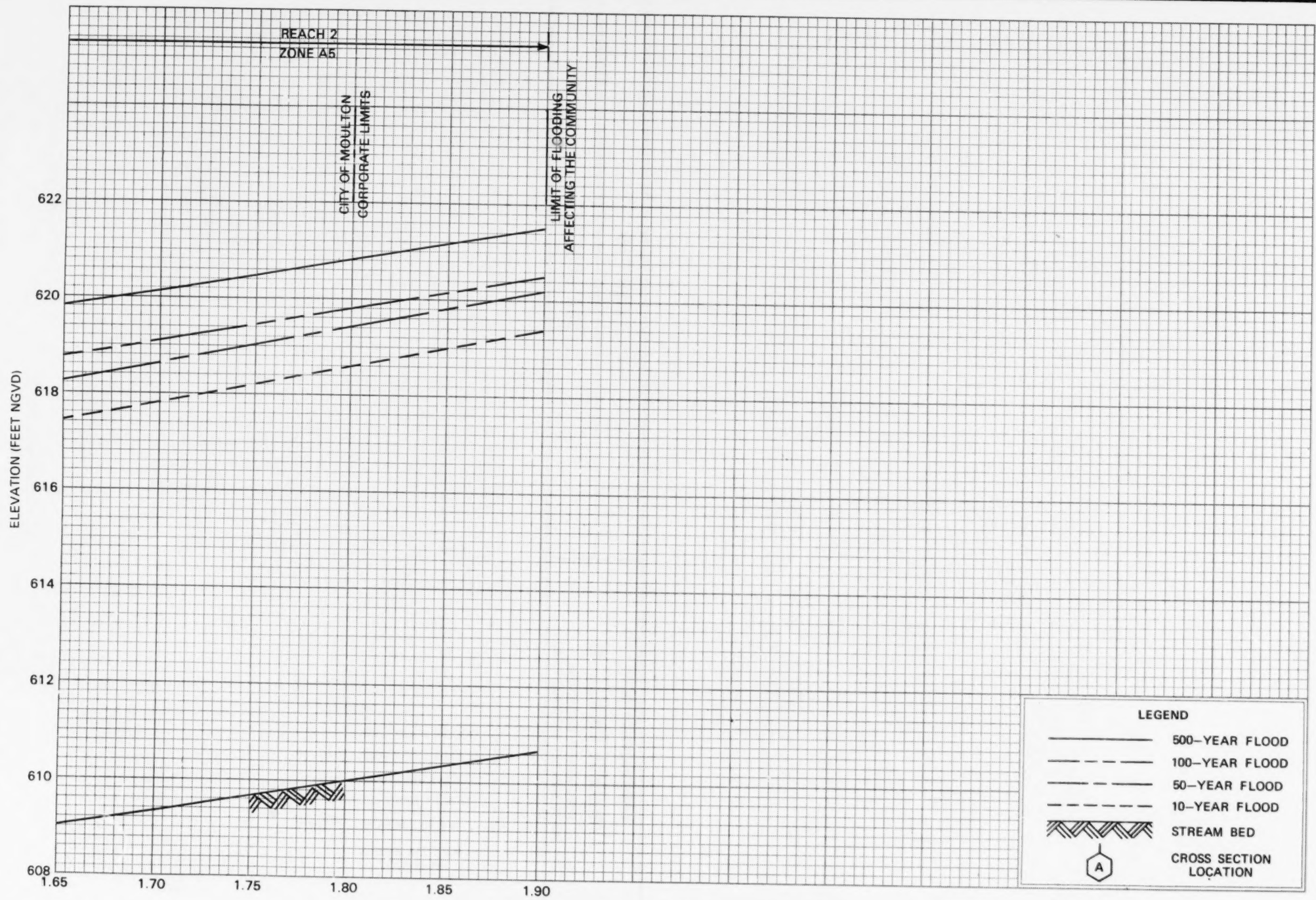
FLOOD PROFILES

CROW BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL
(UNINCORPORATED AREAS)

05P



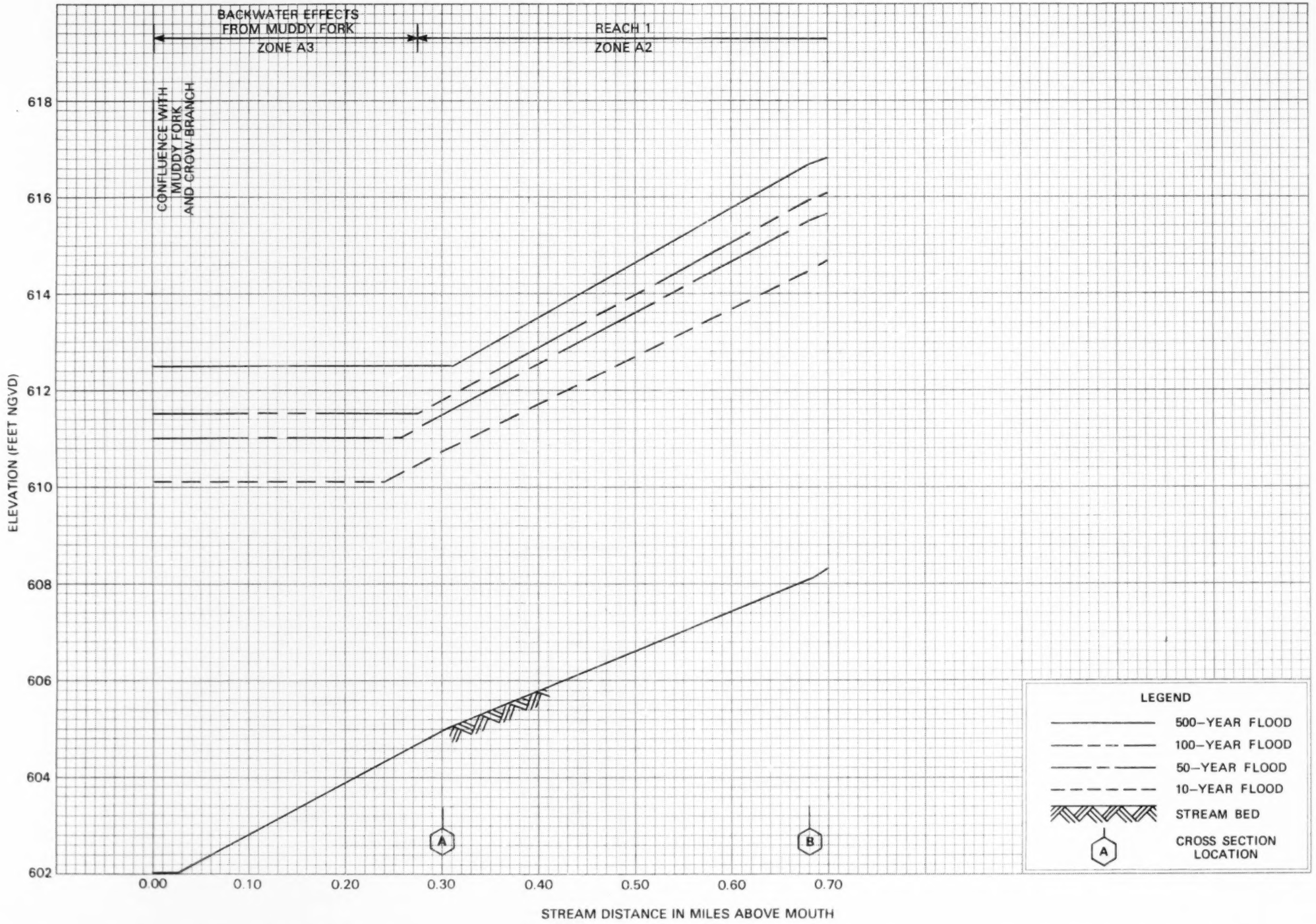
FLOOD PROFILES

CROW BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL
(UNINCORPORATED AREAS)

06P



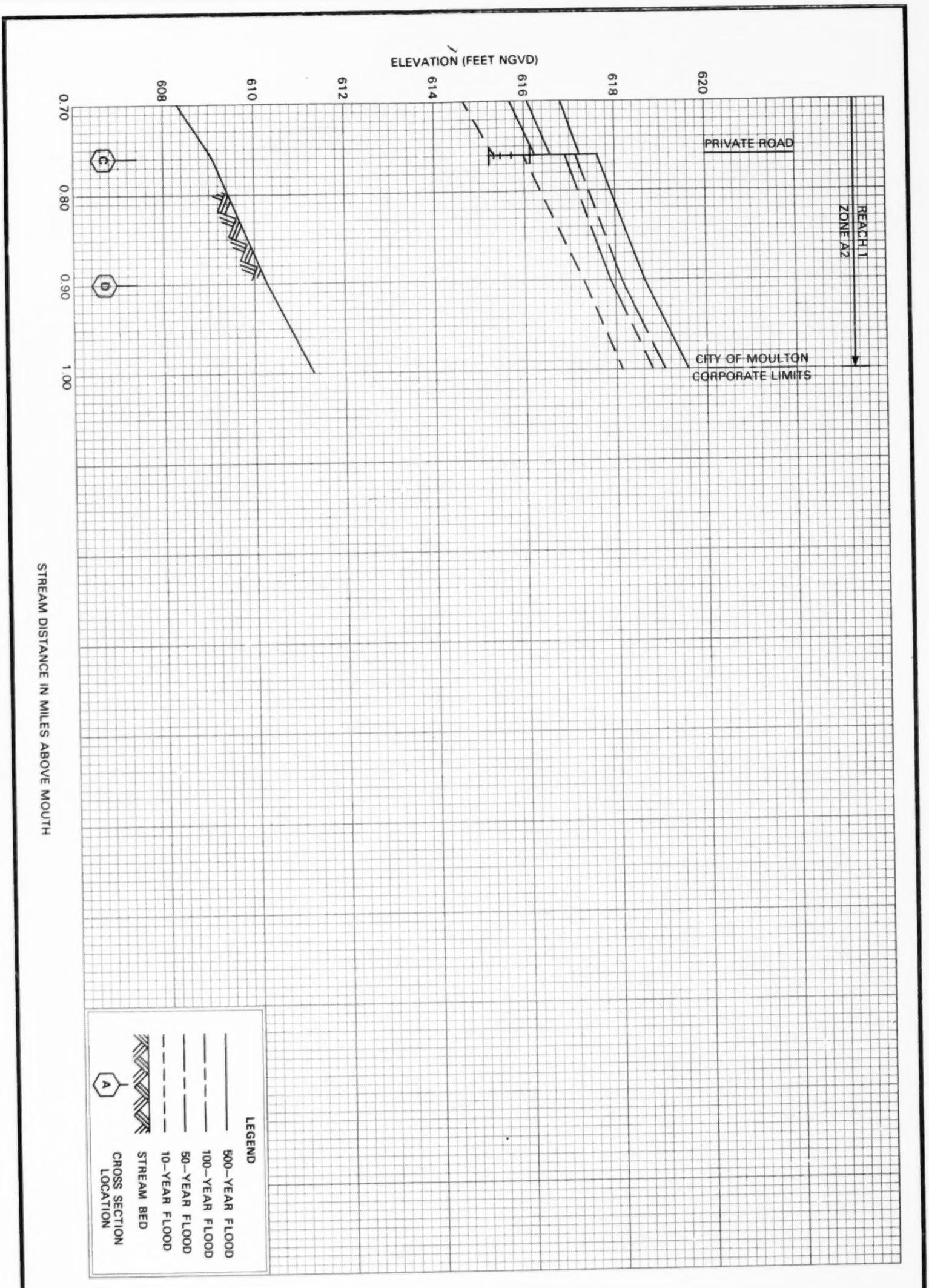
FLOOD PROFILES

LATERAL #8

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

LAWRENCE COUNTY, AL
(UNINCORPORATED AREAS)

07P



08P	FEDERAL EMERGENCY MANAGEMENT AGENCY Federal Insurance Administration **LAWRENCE COUNTY, AL** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **LATERAL #8**